PERCo®

Card Capture Reader

IC-03.1

ASSEMBLY AND OPERATION MANUAL

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Card Capture Reader

IC-03.1

Assembly and Operation Manual

CONTENTS

Dear Customers!

Thank you for choosing a card captures reader manufactured by PERCo.
By making this choice, you have purchased a high-quality product, which will serve you for years to come if you follow installation and operation recommendations.

The Assembly and Operation Manual (hereinafter – the Manual) contains information on transportation, storage, installation and operation of the ***IC-03.1*** **card capture reader** (hereinafter – the card capture reader). The installation must be carried out by qualified installers in strict accordance with the Manual.

Abbreviations adopted in the Manual:

ACS – access control system;
OD – operating device.

1 APPLICATION

The ***IC-03.1*** card capture reader is designed to operate within an ACS as a device for reading, capturing and keeping proximity cards issued to visitors and meant for return at exit (hereinafter – guest cards).

The card capture reader operates together with a controller and an OD – a turnstile or a wicket gate.

To ensure quick and easy passage of people it is recommended to install one card capture reader together with an OD for every 500 people.

Note:

Built-in card reader provide code reading from Proximity identifiers with operation frequency 125 kHz produced by HID Corporation type ProxCard II, ISOProx II, trinkets ProxKey II (standard formats HID: 26 bit (H10301), 37 bit (H10302, H10304)), and the production of EM-Microelectronic-Marin SA.

2 OPERATION CONDITIONS

The card capture reader with regard to resistance to environmental exposure, complies with GOST 15150-69, category U4 (operation in premises with climate control).

Operation of the card capture reader is allowed at an ambient air temperature from +1°C to +45°C and relative air humidity up to 70% at +27°C.

3 TECHNICAL SPECIFICATIONS

DC operating voltage ..... 12 ± 1.2 V DC
Power consumption ..... max. 12 W
Card container capacity .....350 cards
Access cards type ..... *HID*, *EM-Marin*
Interface of the reader's connection with a controller ..... *Wiegand*
Card reading distance at the rated operating voltage:
HID ..... min. 6 cm
EM-Marin ..... min. 8 cm
Standard length of the reader connection cable ..... 0.9 m
Ingress Protection Rating..... IP41 (EN 60529)
Electric shock protection class ..... III (IEC 61140)
Mean time before failure ..... 1,000,000 card captures
Mean lifetime ..... 8 years
Overall dimensions (L × W × H) ..... 194×194 ×1017 mm
Weight (net) ..... max. 15 kg

Overall dimensions of the card capture reader are shown in Figure 1.

4 DELIVERY SET

4.1 Standard delivery set

Main equipment:

Card capture reader 1
Container lock key 2

Technical documentation:

Certificate 1
Assembly and operation manual 1

Package:

Box 1

4.2 Optional equipment supplied on request

The following optional items can be included in the delivery set on customer request:

Anchor PFG IH 10 4
Hexagon key S8 (for anchor bolts M10) 1

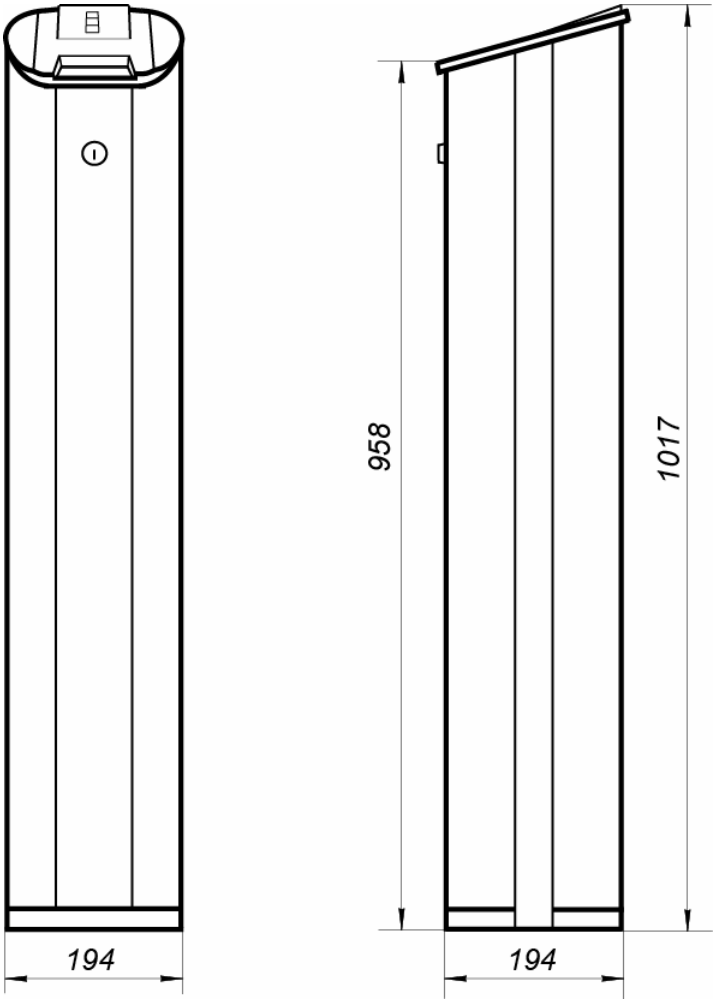

Figure 1. Overall dimensions of the card capture reader

5 PRODUCT DESCRIPTION

5.1 Main features

- Supports permanent cards (without capturing) and guest cards.
- The card capture reader is supplied with the safe voltage – no more than 14 V.
- The card capture reader has low power consumption – no more than 12 W.
- The card capture reader features optical sensors monitoring capturing of guest cards and allowing for correct register of the fact of capturing.
- The container for card collecting is located in the front of the card capture reader, it can be locked with the key.
- External elements of the card capture reader (panels) are made of polished stainless steel.
- On the cover of the card capture reader there is an indication module with mnemonic indicators.

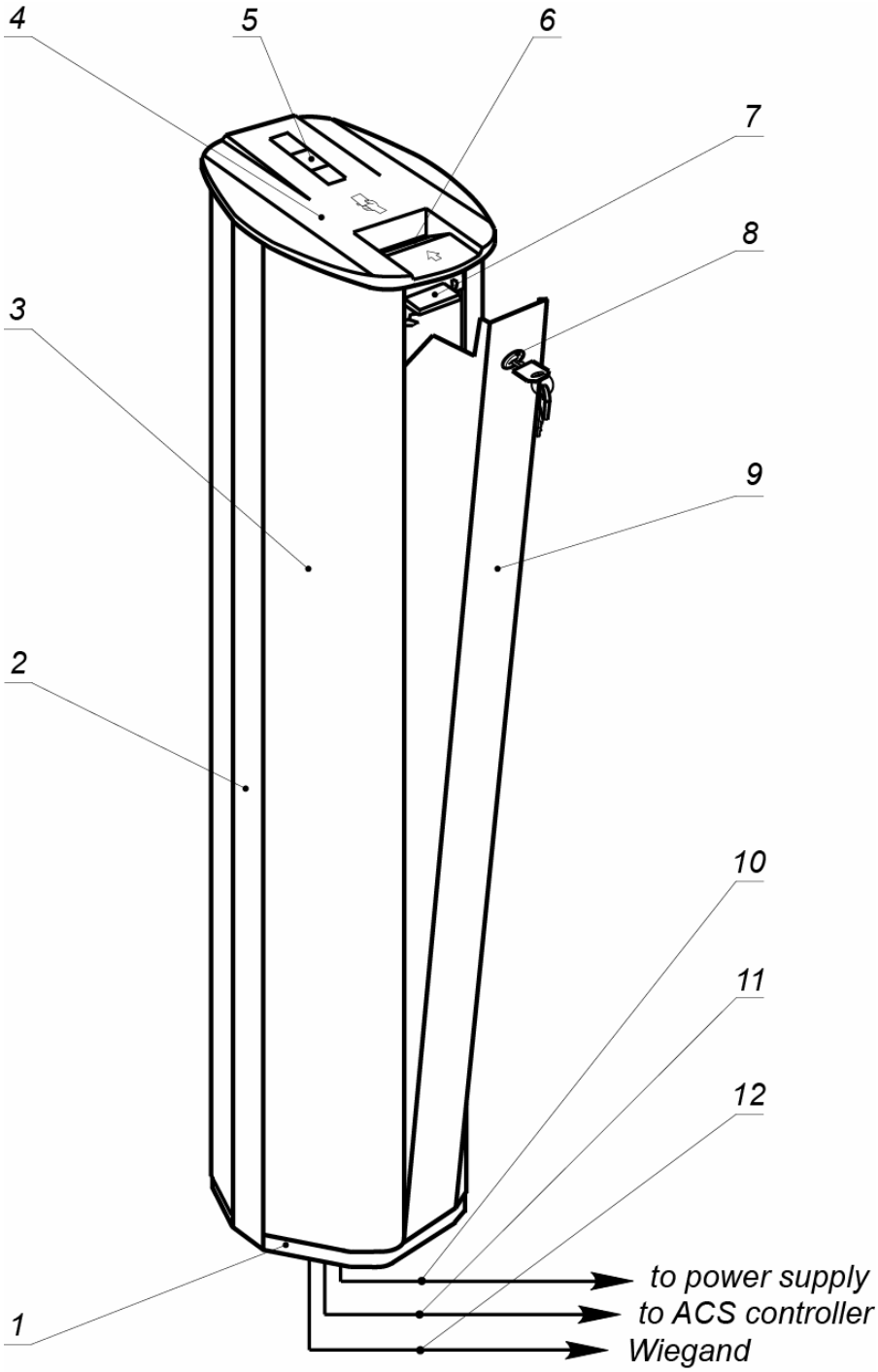

Figure 2. Overall view

Standard delivery set:

1 – base; 2– framework; 3 – housing; 4 – cover; 5 – indication module; 6 – slot for guest cards capturing; 7 – electric drive with a shutter; 8 – container lock; 9 – card container

Not included in the standard delivery set:

10 – card capture reader power cable; 11 – cable for ACS controller connection; 12 – cable for data lines connection of the reader installed in the card capture reader

5.2 Design

The design of the card capture reader is shown in Figure 2. Numbers of the items hereinafter refer to the item numbers as shown in Figure 2.

The cover (4) houses: on the external side – an indication module (5) with 3 mnemonic indicators, (shown in Figure 3), on the internal side – a reader (a control board without casing with an antenna). The cover has a slot for cards capturing (6).

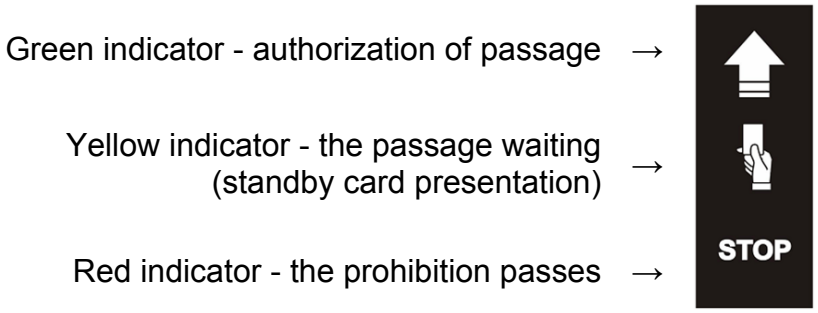

Figure 3. Mnemonic indicators display unit

Card container (9) is fixed to the framework (2) with a lock (8). Housing (3) of the card capture reader is fixed to the framework (2) with screws. When the housing is removed, the following units providing the operation of the card capture reader can be accessed:

- card capture reader control board that is located in its upper part from the panel's side (5);
- electric drive with a shutter (7) that prevents card falling into the card container;
- shutter position optical sensors;
- card position optical sensors, the fact of capturing and overfilling of the container.

5.3 Power supply

The card capture reader is powered from a DC power supply with 12±1.2 V voltage. The card capture reader can either be connected to a separate power supply or parallel to the ACS controller to the general power supply.

When choosing power supply unit make sure it provides a 30% reserve of the consumption current. Maximum consumption current of the card capture reader is 1 A. Maximum consumption current of the ACS controller is given in its certificate.

Power cable (10)[1] is connected to the connector block *XT6* of the card capture reader control board (see Figure 4).

[1] Cable (9) is not included in the set of delivery

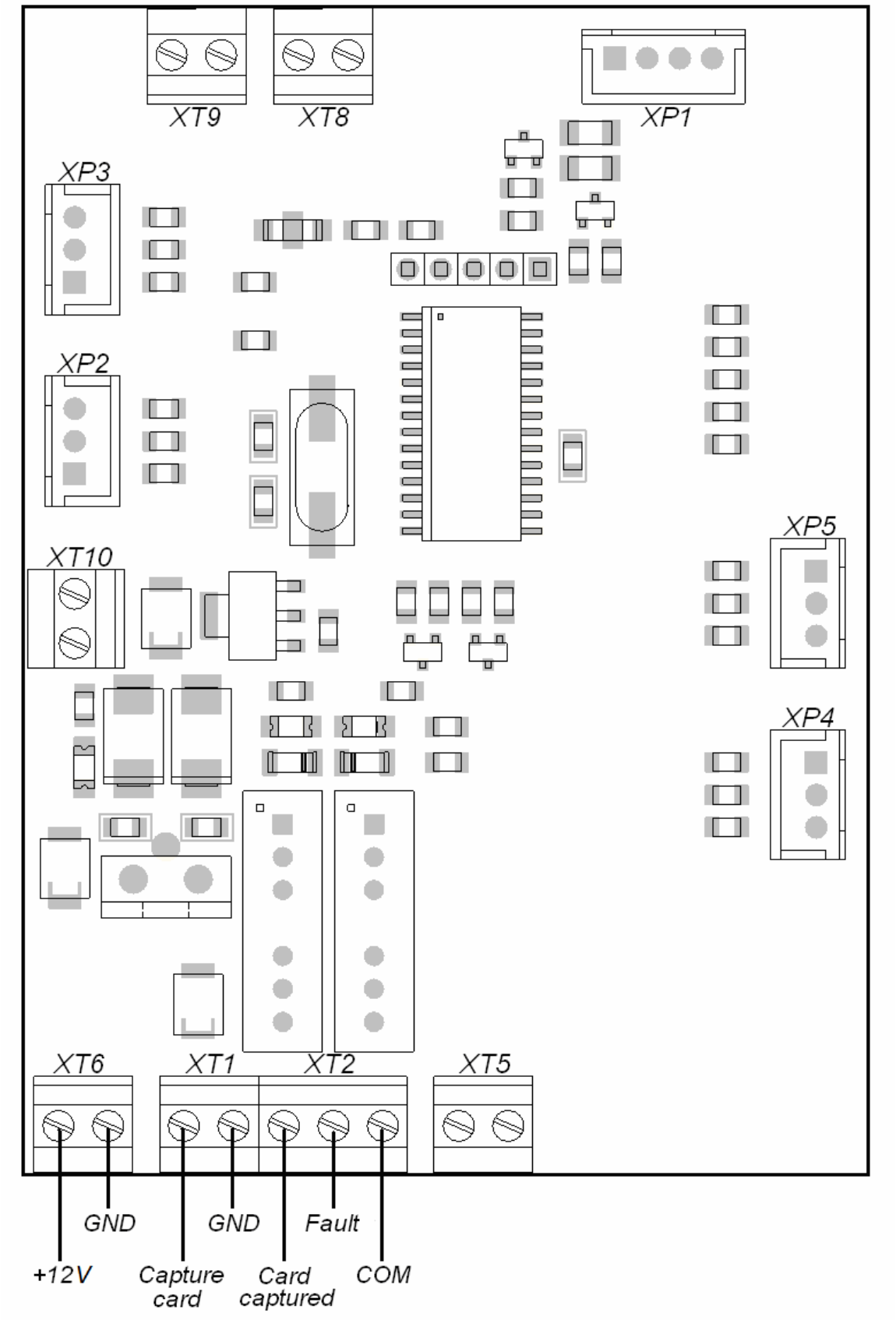

Figure 4. Card capture reader control board

5.4 Control

Wiegand interface lines of the reader located from internal side of the card capture reader cover are intended for connection to the ACS controller (see Figure 8).

An ACS controller controls the card capture reader by sending a signal to the “Capture card” input of the card capture reader control board (contact *1* of the connector block *XT1*).

Card capture reader generates a *“Card captured”* signal (contact *1* of the connector block *XT2*) and in certain cases – signal *“Fault”* (contact *2* of the terminal block *XT2*).

The “Capture card” input is controlled by output of “dry contact” type or “open collector” of the ACS controller. The input is “normal open”, i.e. when a control signal is given the ACS controller closes it to the “GND” contact (contact 2 of the connector block *XT1*).

Input parameters:

- voltage at the open contact relative to “GND” ..... 5±0.5 V
- voltage at the closed contact relative to “GND” .....max. 0.8 V
- current via closed contact .....max. 1.5 mA

The “*Card captured”* and *“Fault”* outputs – of “dry contact” type. Each of these outputs is one of two relay contacts. Other relay contacts are banded and connected to the *“COM”* output (contact *3* of the connector block *XT2*). The outputs are “normal open”, i.e. while producing a signal the corresponding output is connected to *“COM”* contact.

Output parameters:

- max. voltage between the corresponding output and “*COM*” contact ..... 42 V
- max. switched current ..... 200 mA

If an access card inserted into the (3) slot requires to be captured the ACS controller gives a signal to the “*Capture card”* input. At this signal the electromagnet opens the shutter that prevents an access into the card capture reader and the card falls into the card container (6), i.e. the card capturing occurs. If the optic sensor sees that the card at the slot is missing then the electromagnet will not actuate and the access into the card capture reader will remain shut.

At the card falling into the card container the optic sensor registers the fact of card capturing. Only in this case the card capture reader gives the “*Card captured*” signal to the ACS controller. On receiving this signal the ACS controller deactivates the *“Capture card”* signal after which the card capture reader deactivates the *“Card captured”* signal.

On cards capturing the container gets full. When it is full further cards capturing is blocked till the captured cards are extracted from the container. In this case the card capture reader generates the *“Fault”* signal for the ACS controller.

To resume capturing of guest cards it is necessary to extract the full container from the card capture reader and empty the cards.

If the container is free from cards but the card capture reader is still blocked a likely reason for this could be failure of the card capture reader units. It is recommended to apply to the PERCo Technical Support Department.

5.5 Indication setting

The reader of the card capture reader has sound and light indication. It can function in one of two variants of light indication control: “double line” – control via two lines and “single line” – control via one line. At delivery the card capture reader is in light indication control variant – “single line” (control via one line).

To switch on the “double line” control variant, during installation cut with pliers the “single-double” jumper that is located on the back side of the reader casing under the metal base.

Change of a light indication color depending on the chosen mode of external control is controlled via blue and yellow wires according to Table 1.

Table 1. Reader indication

Control signals at a connection cable of the reader		LED light in different modes at external control	
blue wire	**yellow wire**	**“single line”**	**“double line”**
0	0	green	red and green
0	HZ	green	red
HZ	0	red	green
HZ	HZ	red	yellow

- 0 – control line is connected to a negative of the power supply;
- HZ – high resistance at a control line (the line is not connected to negative of the power supply).

The card code reading is confirmed by the short-time alteration of the yellow (central) light indicator’s state.

It is possible externally control light indication of the reader – to do so it is necessary to supply the low level signal to the corresponding control line.

For external switching on of sound signal of the reader its brown wire is connected to a negative terminal of the power supply.

5.6 Change of output data format of the reader

Attention!

Switching of the reader into one of the given *Wiegand* formats does not prevent it from reading cards of other formats and submitting of the read code to the reader’s output according to the current format.

To change a format of outcoming data of the *Wiegand* interface an orange wire (WF – *Wiegand*-Format) is used according to Table 2. All switching’s are to be done prior to the power supply to the reader. On extension of the reader connection cable to the ACS controller it is recommended to do the mode alteration of light indication external control and outcoming data format exactly at connection place of the standard and extension cable.

Table 2. The order of the reader output data format alteration

Connection point (conductor) at the regular connection cable output	Outcoming data format of the reader determined by the connection done
D0 (green)	*Wiegand 37*
“ground” (black + shield)	*Wiegand*
Not connected	*Wiegand 26*

6 MARKING AND PACKAGING

The card capture reader has a marking - a label placed on the internal side of the housing. It contains the name of the product, designation, the date of manufacture, the serial number.

The card capture reader in the standard delivery set (see Clause 4.1) is packed in a transportation box that protects its components from damage during transportation and storage.

Box overall dimensions ..... 110×24×24 cm
Box weight ..... max. 18 kg

7 SAFETY REQUIREMENTS

7.1 Installation safety requirements

Installation should be carried out by qualified personnel after careful study of this Manual in accordance with general rules for electrical and installation works.

Attention!

While installation:

- all works should be performed only with the power supply switched off from the AC mains;
- only serviceable tools should be used for installation;
- while the installation of the card capture reader until it is fixed, be extra cautious and protect it from falling down;
- before the first switching on of the card capture reader make sure it is installed correctly;
- do not connect the card capture reader to a power supply unit with voltage and frequency different from those given in the Manual (Chapter 3).

Installation of the power supply unit should be done in compliance with safety measures described in its certificate.

7.2 Operation safety requirements

Observe general electrical safety rules when operating the card capture reader.

Warning! Not allowed to operate the card capture reader:

- under conditions that do not comply with the requirements of Chapter 2 of this Manual.
- at supply voltage that does not comply with the requirements of Chapter 3 of the Manual.

The operation of the power supply should be done in compliance with safety measures described in its certificate.

8 INSTALLATION INSTRUCTIONS

8.1 Installation details

Attention!

When installing the equipment, observe precautions (see Clause 7.1).

Proper installation is critical to performance and serviceability of the card capture reader. We strongly advise to study this section before installation work, and follow the instructions to the latter.

Attention!

The manufacturer will not accept liability for any damage to the card capture reader or otherwise loss caused as a result of improper installation, and will dismiss any claims by the customer should the installation work be carried out not in accordance with this Manual.

We recommend:

- installation to be carried out by at least two persons qualified to perform assembly and electric works;
- mount the card capture reader on flat, solid concrete floors (grade 400 or higher, SCS B22.5), stone or similar foundations at least 150 mm thick;
- use reinforcing elements 300×300×150 mm for installation on less steady foundations;
- make sure the mounting foundation is horizontal and flat; the flatness deviation must not exceed 1,5 mm;
- use *"SORMAT"* anchor bolts to fix the card capture reader.

8.2 Installation tools

We advise to use the following tools for the installation work:

- hammer drill 1.2÷1.5 kW;
- Ø16 mm hard-alloyed drill bits;
- *S8* hexagon wrench;
- cross-head screwdriver No. 2 (150mm);
- knife;
- measuring tape (1 m);
- level gauge.

Note:

Other tools can be used that don't deteriorate the quality of installation work.

8.3 Cables parameters

Table 3. Recommended cable type for connection reader to external controller

№ cable	Connection	Max. length, m	Cable type	Example
1	Card capture reader – power supply	30 50	Twisted pair cable with cross section min. 0.75 mm^2	2×0.75 2×1.5
2	Card capture reader – ACS controller	40	24AWG – 18AWG (0.2 – 0.8 mm^2)	RAMCRO SA82BI-T, CABS8/EC, 8C.SEC-SC, W8ekw
3	*Wiegand* connection to ACS controller			

Note:

Maximum distance between the reader and external controller depends on the cable cross-section. For selecting the cable type please contact PERCo specialists. For the given cable types reader performance after 40 m is not guaranteed.

8.4 Installation

Further installation instructions are given with the earlier mentioned recommendations (see Clause 8.1) taken into account. Recommendations on preparation of mounting holes in the mounting surface are given with regard to *"SORMAT"* anchor bolts for solid concrete floors.

1. Unpack the card capture reader; check the delivery set completeness as per section 3 of the Certificate.
2. The card capture reader is placed at an exit from the territory before the OD. For easy and handy service of the card capture reader during operation it is recommended to place it so that there was free space of not less than 0,5 m from its back panel's side.
3. Mark out mounting holes following Figure 5 on the mounting surface for the card capture reader installation, as well as mark electric raceways for the power cable (10)[1], cable for connection an ACS controller (11)[1] and cable for the reader's data lines connection (12)[1] to *A* zone of the cables input to the card capture reader with regard to location of the power supply, ACS controller and OD.

Note:

Material, configuration, dimensions, wiring type (surface, buried, combined), position at the entrance point and other characteristics of the electric raceways **are chosen by the customer** in accordance with the entrance point features and layouts, other operational factors.

[1] Cables (9), (10) and (11) are not included in the standard delivery set

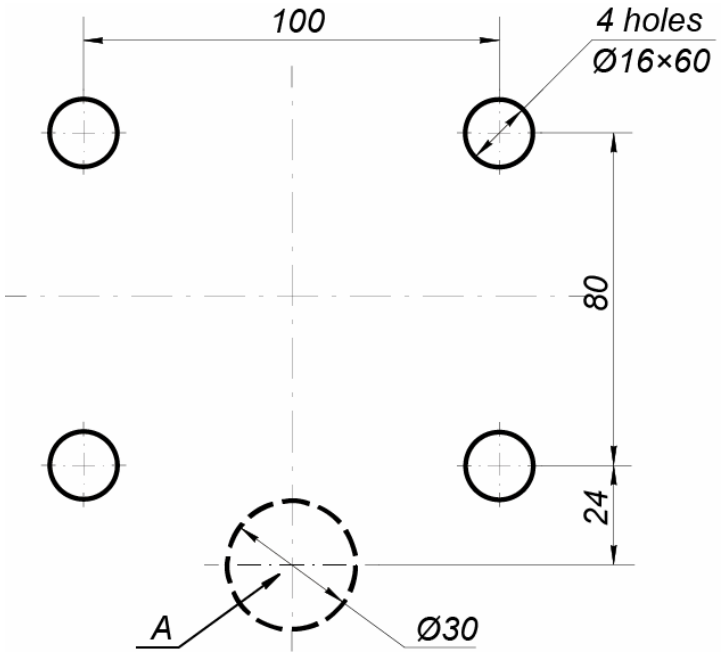

Figure 5. Floor anchor position and cable entries (A) for *IC-03.1* housing installation

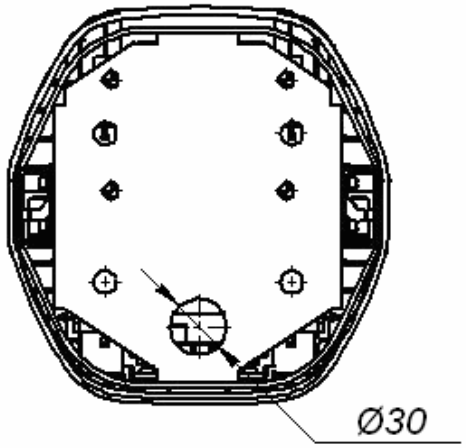

Figure 6. Base bottom view:
central hole Ø30 mm is intended for cables entry

4. Prepare the electric raceways and mounting holes for the card capture reader installation. Set the anchors all the way down the prepared holes.
5. Take out the container (9) (see Section 10.4).
6. Carefully lift up the cover (4) fixed to the framework with pressure pads and while not disconnecting the reader cable move the cover in order to provide access to two screws that fix the housing (3). Loose the screws, take off the housing (3) from the card capture reader.
7. Place the card capture reader down on the mounting surface so that its base (1) was near *A* zone (see Figure 5).
8. Pull cables (10), (11) and (12) through the central hole (Ø30 mm) in the base (see Figure 6) inside the card capture reader and further up along the housing to the control board. The length of the cables that remain inside the card capture reader after their pulling should be enough for their further connection. It is recommended to secure all cables on the internal sides of the base (1) and framework (2) with cable ties[1] and self-adhesive cable tie mounts[1].

[1] Cable ties and self-adhesive cable tie mounts are not included in the set of delivery

Attention!

Be extra cautious and careful when carrying out further works, make sure the card capture reader does not fall until it is fixed in place.

9. Put the base (1) of the card capture reader to *A* zone. Match four holes in the base with holes in the mounting surface. Fix the card capture reader with anchor bolts, controlling its vertical position with a level gauge.
10. Pull the cables in the corresponding electric raceways.
11. Connect the cables (10)[1], (11)[2] to the card capture reader control board located in its upper part from the housing (3) side. Make connection according to wiring diagram (see Figure 7). The list elements designated in scheme shown in Table 4.
12. Connect the reader with the cable (12)[2] according to wiring diagram (see Figure 8). When the reader is connected to the ACS controller as per the given diagram, external control of the light indication in accordance with the “single-double” jumper position (see Clause 5.6) and *Wiegand 26* output data format (orange wire – WF not connected) are set up automatically.

Note:

When the cable between a reader and external controller is extended it is recommended to arrange switching over of external control over LED indication and format of output data in the connection place of a regular reader cable with an extension cable.

12.1. If necessary to change the LED indication control mode into *«double line»* (Table 1) please cut the jumper on the backside of the built-in reader board.

12.2. To change a format of outcoming data of the *Wiegand* interface an orange wire WF is used according to Table 2.

13. Install the housing (3) into operating position and fix it with screws. Install the card container (9) into operating position by closing the lock (8). Install the cover (4) into operating position by pushing it down carefully until it is fixed with pressure pads and by adjusting its position in relation to the framework.
14. Check accuracy and integrity of all cables laid. Check accuracy and reliability of all electrical connections of the card capture reader with power supply and ACS controller.
15. On completion of checking the card capture reader is ready for operation.

Table 4. Wiring diagram elements

Position	Name	Q-ty
A1	Card capture reader ***IC-03.1***	1
A2*	ACS controller	1
A3*	Power supply	1
1*	Card capture reader power cable	1
2*	Cable for ACS controller connection	1
3*	Cable for connection of the reader installed in a card capture reader	1

* Equipment is not included in the standard set of delivery.
** Can be connected to an ACS input.

[1] Cables (9), (10) and (11) are not included in the standard delivery set

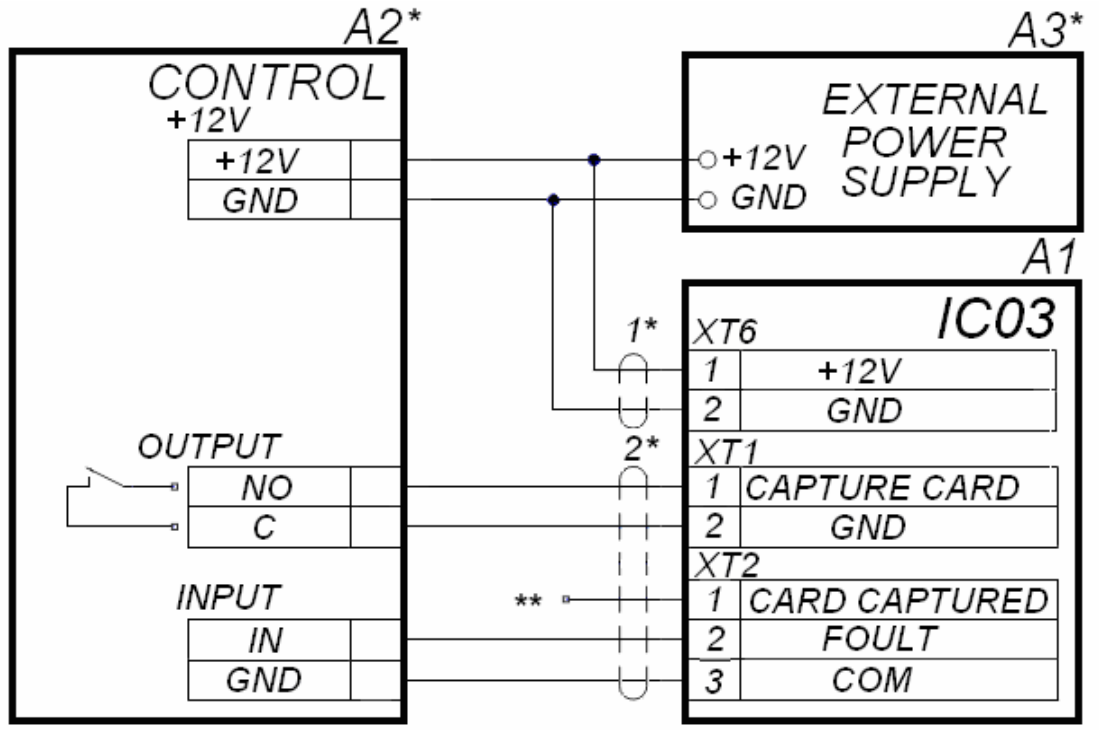

Figure 7. Wiring diagram card capture reader – ACS controller

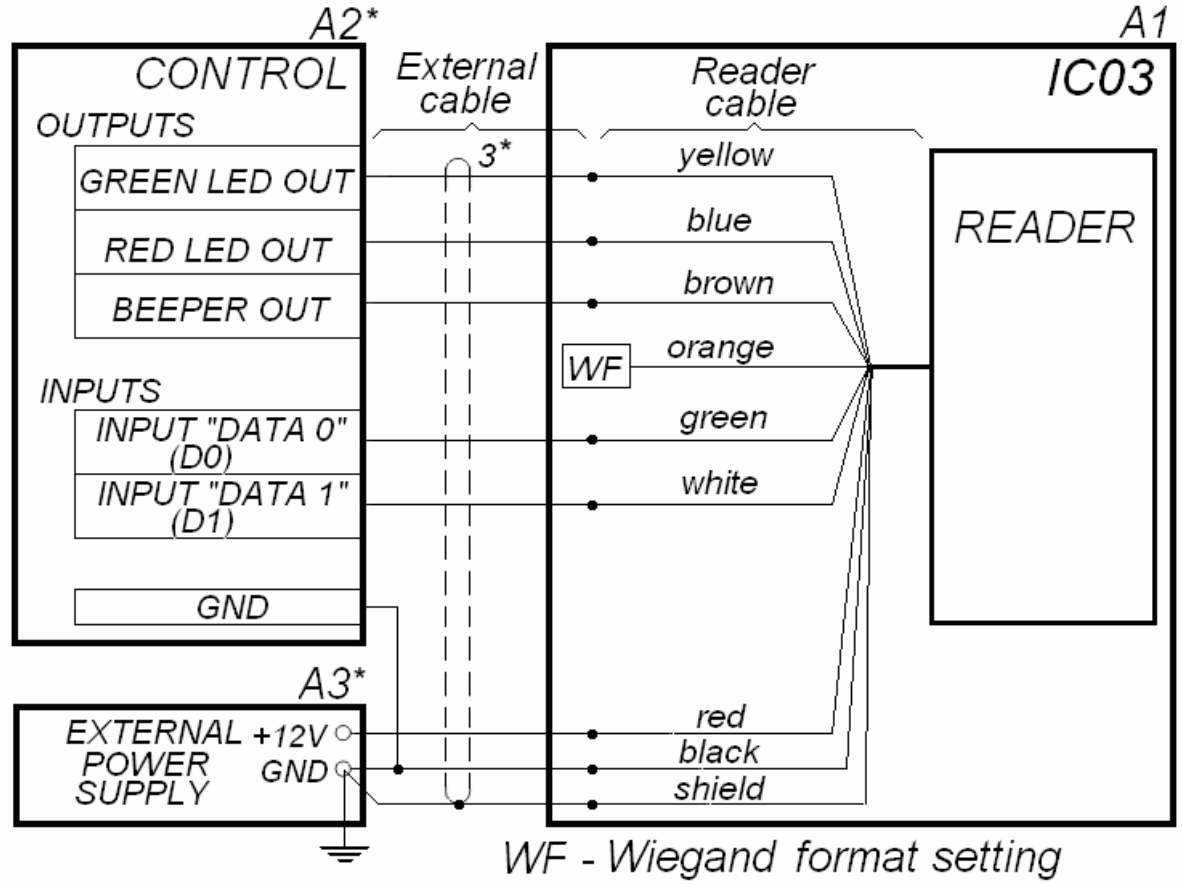

Figure 8. Wiring diagram for connection of the reader of the card capture reader to ACS controller via *Wiegand* interface

9 POWER-UP

1. Check integrity and accuracy of all electrical connections.
2. Connect power supply unit to the mains with voltage and frequency given in its Certificate.
3. Switch on the power supply unit. On the indication module (5) a yellow indicator: card presentation is expected will light up which means that the card capture reader is in the standby mode – initial state.
4. Check operation of the card capture reader together with the ACS controller in all modes according to the operation algorithm (see Clauses 10.1, 10.2).

10 OPERATION INSTRUCTIONS

Attention!

When operation the equipment, observe precautions (Clause 7.2).

Warning! Don'ts:

- dismantle and/or adjust operational units of the card capture reader;
- clean the card capture reader with substances that may cause damage or corrosion;
- keep the card capture reader out of jerking and thrusting.

Control over indication of the built-in reader inside the card capture reader is made by the ACS controller. Control signals in different modes are given in clause 5.5.

At the standby mode the operating device is blocked. Code reading is provided by presenting cards to the reader and confirmed by momentary change of yellow LED indicator.

10.1 Presenting a quest card

The guest card is presented by inserting it into the slot for cards capturing (6).

At the guest card presentation, considering that card is operative and its validity corresponds to the time of passage, the ACS controller sends a signal to the card capture reader to capture the card and switches into the *"Verification"* mode (waiting for the *"Card captured"* signal from the card capture reader). It is recommended to apply the LED control signal to indication module (5) for simultaneous blinking of green and red indicators at that.

In case of the ban on passage (card fault, card invalidity corresponding to the time of passage or access wrights) the ACS controller does not switch to *"Verification"* mode. It is recommended to switch on for 2 sec. the red indicator and sound signal on the indication module at that. The ACS controller switches back to the standby mode after that.

Being in the *"Verification"* mode the ACS controller receives the "*Card captured*" signal at the card falling into the card container. After receiving this signal the ACS controller will unblock the operating device. It is recommended to switch on the green indicator on the indication module at that showing authorization of passage. After that the ACS controller blocks the operating device and switches back to the standby mode.

If at the *"Verification"* mode expiration the ACS controller does not receive the "*Card captured*" signal from the reader it will not unblock the operating device. It is recommended to switch on for 2 sec. the red indicator and sound signal on the indication module at that. The ACS controller switches back to the standby mode after that. The missing of the signal

"*Card captured*" shows that the card has not fallen into card container. The reason can be blocking of card container, card capture reader failure or if the card was not inserted into the slot.

Attention!

If the passage was not authorized the visitor shall take the card out of the slot and refer to the entrance operator.

10.2 Presenting a permanent card

The permanent card is presented to the top cover of the card capture reader.

At the permanent card presentation, considering that card is operative and its validity corresponds to the time of passage, the ACS controller sends a signal to unblock the operating device. It is recommended to switch on the green indicator on the indication module at that showing authorization of passage. After that the ACS controller blocks the operating device and switches back to the standby mode

In case of the ban on passage (card fault, card invalidity corresponding to the time of passage or access wrights) it is recommended to switch on for 2 sec. the red indicator and sound signal on the indication module at that. The ACS controller switches back to the standby mode after that.

10.3 Blocking and resume of card capturing

On cards capturing the container gets full. When it is full further cards capturing is blocked till the captured cards are extracted from the container. In this case the card capture reader generates the *"Fault"* signal for the ACS controller.

At blocking of the guest card capturing it is recommended to set up the following indication on the indication module: at first blinking of the green and red indicators, after that switch on for 2 sec. the red indicator and sound signal. The ACS controller switches back to the standby mode after that.

Note:

While the capturing of guest cards is blocked the permanent cards are operated in normal order.

To resume capturing of guest cards it is necessary to extract the full container (9) from the card capture reader and empty the cards (the order of the container extraction and installation is described in Clause 10.4.

If the container is free from cards but the card capture reader is still blocked a likely reason for this could be failure of the card capture reader units. It is recommended to apply to the PERCo Technical Support Department.

10.4 Removal and installation of the card container

To take out the card container (9) from the card capture reader proceed as follows:

1 Switch off the power supply of the card capture reader.
2 Insert the key into the lock (8).
3 Turn the key all the way (open the lock).
4 Tilt the card container in the front direction.
5 Lift the container and take it away.

To insert the card container into the card capture reader proceed as follows:

1. Set the card container into operating position, to do so set its lower end into the card capture reader with a slight inclination and then give it a vertical position; correct installation of the container does not require much effort.
2. Turn the key in the lock all the way (*close* the lock); after the lock closing the panel should lean tightly on the card capture reader's framework (2) without distortions.
3. When necessary to continue operation of the card capture reader switch on its power supply.

11 TRANSPORTATION AND STORAGE

The card capture reader in the original package should be transported only in closed freight containers or other closed type cargo transport units.

During storage and transportation the boxes can be stacked no more than 5 layers high.

The card capture reader should be stored in dry indoor facilities at ambient temperatures between –40°C and +45°C and at relative air humidity of up to 98% at +25°C. The storage room should be free from vapors of acids, alkalis, and gases that cause corrosion.

After transportation or storage at below-zero temperatures or high air humidity, the card capture reader should be kept unpacked for no less than 24 hours under normal climate conditions (see Chapter 2) prior to install.

12 TROUBLESHOOTING

Possible faults to be corrected by the customers themselves are listed in Table 5.

For faults not listed in Table 5 we advise to consult PERCo Technical Support Department.

Table 5. Possible failures and troubleshooting

Fault	Probable cause	Remedy
Power supplies are on, but the card capture reader does not function, the LED indicators are off	Faulty connection or breakdown of power supply cable (10). Faulty power supply unit.	Replace the cable (10). Replace the power supply unit.
The LED indicators are on but the card capture reader is not controlled by the ACS controller	Faulty connection or breakdown of connection cable (11) of the ACS controller	Replace the connection cable (11)

13 MAINTENANCE

Maintenance of the card capture reader during operation is reduced to periodic cleaning of its outer surfaces. To remove dirt it is recommended to use liquid cleaners without abrasives containing ammonia.

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